Math ratio teaching materials that can be operated by touch

○About this math ratio teaching material

▸This is a teaching material to learn the concept of quantity called "ratio" while experiencing it with the sense of touch.

▸A base reference line is provided on the left edge of the whiteboard for easy comparison by touch.

▸A 3D printer is used to create covers that can be placed over two, three, or four tiles, allowing the children with visual impairment to easily understand the concept of ratio by touch.

▸Magnets are attached to the back of the tiles so that they can be fixed to the whiteboard.

―When teaching that the ratios 4:8, 2:4, and 1:2 are all 1:2―
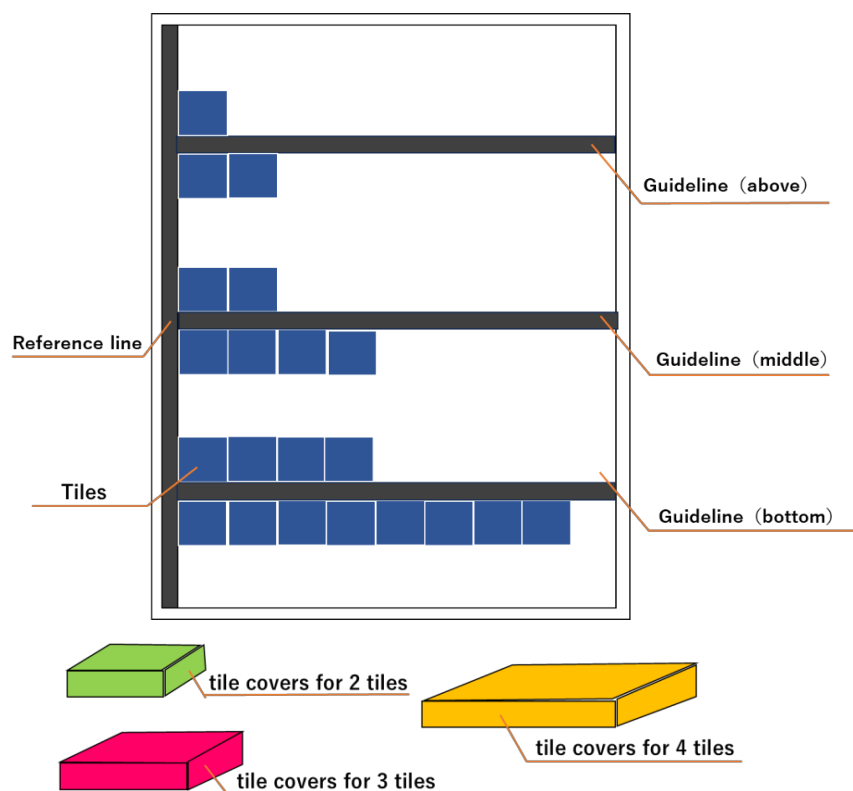
1. Touch and confirm the contents of the teaching material.

①Touch the materials with the child and match the names and

components (Tiles, cover of 2, cover of 3, cover of 4, white board, reference line, guideline (top), guideline (middle), guideline (bottom)).

②For example, assuming that the ratio is 2:3, line up 2 tiles on the top and 3 tiles on the bottom across the guideline (top) to understand how the ratio is represented in this teaching material.

2. Practice tactile manipulation

①Arrange 1 tile on the upper side and 2 on the lower side along the guideline (top). The tiles should be aligned with the reference line as the starting point. Confirm by touching the material that this represents 1:2 across the guideline (top).

②Similarly, arrange the tiles so that they are 2:4 along the guideline (middle) and 4:8 along the guideline (bottom).

3. Procedures for learning through the use of teaching materials

①If we consider 2:4 and 4:8, we can be sure that if we cover the 4:8 with a cover of 2, both will be 2:4.

②If we consider 1:2 and 2:4, we can be sure that if we cover the 2:4 with a cover of 2, both will be 1:2.
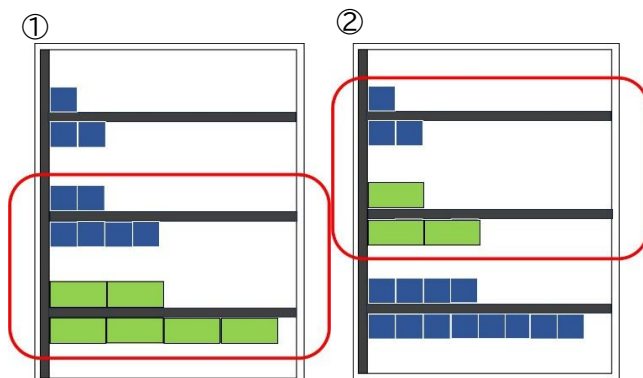
③For 1:2 and 4:8, a 4:8 (apparently 2:4) with a cover of
   4 would be 1:2. In short, we can confirm that both are
   1:2.

④Confirm that 1:2, 2:4, and 4:8 can all be considered 1:2,
   depending on what the criteria are.

▸What to do after this step.
・To be able to freely manipulate ratios based on numbers
   other than 1, such as touching and comparing with 2:3, 4:6 and
   6:9.

・To be able to think in words, not operations, and solve problems
   based on the images you have formed, even if they are ratios
   of numbers larger than 10.

・To confirm that " ratio" can be expressed in different ways by
   changing the standard scale.